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FORM PTO-1390 (REV 10-2000) U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER	
6077-08WOUS	
U.S. APPLICATION NO. (If known, see 37 CFR 1.5)	10/070151

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/EP00/07949	August 16, 2000	September 3, 1999

TITLE OF INVENTION: DEVICE FOR DISTRIBUTING BULK MATERIALS WITH ROTARY CHUTE HAVING A VARIABLE ANGLE INCLINATION

APPLICANT(S) FOR DO/EO/US: PAUL WURTH S.A. et al

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☑ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☐ This is an express request to promptly begin national examination procedures (35 U.S.C. 371(f)).
4. ☑ The US has been elected by the expiration of 19 months from the priority date (PCT Article 31).
5. ☑ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
   a. ☐ is attached hereto (required only if not communicated by the International Bureau).
   b. ☑ has been communicated by the International Bureau.
   c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☑ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
7. ☑ Amendments to the claims of the International Application under PCT Article 19(35 U.S.C. 371(c)(3))
   a. ☐ are attached hereto (required only if not communicated by the International Bureau).
   b. ☐ have been communicated by the International Bureau.
   c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
   d. ☑ have not been made and will not be made.
8. ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C.371(c)(3)).
9. ☑ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☑ An English language translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11 to 16 below concern document(s) or information included:

11. ☑ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☑ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☑ A FIRST preliminary amendment.
    ☐ A SECOND or SUBSEQUENT preliminary amendment.
14. ☐ A substitute specification.
15. ☐ A change of power of attorney and/or address letter.
16. ☑ Other items or information:
    1. PCT/IPEA/416 & PCT/IPEA/409 including English LanguageTranslation of the Annexes to the IPER.
    2. PCT/IB/308.
    3. PCT/IB/304.
    4. PCT/ISA/210.
    5. English Language Translation of the International Application as Filed and as Amended by the Annexes to the IPER.

"EXPRESS MAIL" NO. EV019687161US

Date Of Deposit: March 1, 2002

I hereby certify that this paper is being deposited with the U.S. Postal Service "EXPRESS MAIL POST OFFICE TO ADDRESSEE" Service Under 37 CFR 1.10 on the date indicated above and is addressed to: U.S. Patent And Trademark Office, Washington, D.C. 20231

Mary E. Dionne

(Name of person mailing paper)

(Signature)

U.S. APPLICATION NO. (if known, see 37 CFR 1.5)	INTERNATIONAL APPLICATION NO.	ATTORNEY'S DOCKET NUMBER
10/070151	PCT/EP00/07949	6077-08WOUS

17. ☑ The following fees are submitted:

BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)):

	CALCULATIONS PTO USE ONLY
Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO **$1000.00**	
International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO **$860.00**	
International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO **$710.00**	
International preliminary examination fee paid to USPTO (37 CFR 1.482) but all claims did not satisfy provisions of PCT Article 33(1)-(4) **$690.00**	
International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(1)-(4) **$100.00**	
ENTER APPROPRIATE BASIC FEE AMOUNT =	$ 860.00
Surcharge of **$130.00** for furnishing the oath or declaration later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492(e)).	$

CLAIMS	NUMBER FILED		NUMBER EXTRA	RATE	
Total claims	10	- 20 =	0	X **$18.00**	$ 0
Independent claims	1	- 3 =	0	X **$80.00**	$ 0
MULTIPLE DEPENDENT CLAIM(S) (if applicable)				+ **$270.00**	$ 0

TOTAL OF ABOVE CALCULATIONS =	$ 860.00
☐ Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.	$
SUBTOTAL =	$ 860.00
Processing fee of **$130.00** for furnishing the English translation later than ☐20 ☐30 months from the earliest claimed priority date (37 CFR 1.492(f)). +	$ 0
TOTAL NATIONAL FEE =	$ 860.00
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). **$40.00** per property +	$ 40.00
TOTAL FEES ENCLOSED =	$ 900.00
Amount to be refunded:	$
charged:	$

a. ☑ A check in the amount of $ 900.00 to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account No. 13-0235 in the amount of $_____ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. ☑ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 13-0235. A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pendin g status.

SEND ALL CORRESPONDENCE TO:

Nicholas J. Tuccillo, Esq.
McCormick, Paulding & Huber LLP
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Hartford, C onnecticut 06103-3402

SIGNATURE

Nicholas J. Tuccillo, Esq.
NAME

44,322
REGISTRATION NUMBER

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Mary E. Dionne
(TYPED OR PRINTED NAME OF PERSON MAILING PAPER OR FEE)

(SIGNATURE OF PERSON MAILING PAPER OR FEE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the Application of	)	
	)	Examiner: Not Assigned
EMILE LONARDI, ET AL.	)	Group Art Unit: Unknown
	)	
on: DEVICE FOR DISTRIBUTING BULK MATERIALS WITH ROTARY CHUTE HAVING A VARIABLE ANGLE OF INCLINATION	)	
Serial No.: Unknown	)	
Filed on: Concurrently herewith	)	(Our Docket No. 6077-08WOUS)

Box **PCT**
ASSISTANT COMMISSIONER OF PATENTS
Washington, D.C. 20231

PRELIMINARY AMENDMENT

Dear Sir:

Prior to calculating the filing fee and examining the application, please amend the above-referenced patent application as follows:

In the Specification:

Page 1

Page 1, between lines 2 and 3, please insert the following, FIELD OF THE INVENTION.

Page 1, line 10, please insert the following, BACKGROUND OF THE INVENTION.

Page 2

Page 2, line 16 please insert the following paragraph and title,

The charging device described in the patent application FR 882167 comprises an oscillating charging tube, which is suspended by means of two long horizontal arms like a pendulum in a rotary cylinder. The extremities of the suspension arms are mounted on bearings in the rotary cylinder. One of these extremities carries an actuation lever. A knee-shaped control lever is fixed to the cylinder by means of a bearing. A first extremity of the control lever is connected by a connecting rod to an oscillation mechanism. A second extremity of the control lever bears a slide, which is guided in a closed runner of the activating lever. It is not described how to remove the charging tube.

SUMMARY OF THE INVENTION

Please replace the paragraph on page 2, line 23, through page 3 line 4, with the following paragraph,

A device for distributing materials in bulk according to the invention comprises a suspension rotor and a chute located below the suspension rotor. This chute is provided with two lateral suspension arms extending upwards where they are connected to the suspension rotor so as to define a roughly horizontal pivoting axis for the chute on the suspension rotor. The device also comprises a driving mechanism for producing a pivoting torque capable of pivoting the chute about its pivoting axis. A cylindrical suspension pin is associated with each suspension arm for pivotably connecting it to the suspension rotor. Each of these two cylindrical suspension pins is arranged in a retractable manner in a bearing of the suspension rotor. A control lever is connected to the suspension rotor by means of an articulated joint. The driving mechanism is connected to this control lever to transmit to the latter the pivoting torque. In order to transmit this pivoting torque to a suspension arm, the control lever is provided with a stop, which comes into contact with a counterstop provided on the respective suspension arm. The stop and counterstop are moreover designed in such a way that they can be disengaged by a translation movement of the two suspension arms after withdrawing the cylindrical suspension pins for removal of the chute. It should be appreciated that this device is distinguished by a very simple and very

compact suspension of the chute, which enables large pivoting torques to be transmitted to the chute, while ensuring easy removal and installation of the chute.

Page 4

Please replace the paragraph on page 4, lines 9-14, with the following paragraph,

In order to facilitate the installation and removal of the suspension pins, each of the two suspension arms of the chute advantageously comprises an oblong hole for the passage of its suspension pin, so that the two suspension pins can be freed by raising the chute.

Page 5

Page 5, prior to line 1, please insert, BRIEF DESCRIPTION OF THE DRAWINGS.

Page 5, line 18, please insert the following DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT.

In the Claims:

Please cancel existing Claims 1-10.

Please add the following new Claims 11-20:

11. A device for distributing materials in bulk comprising:

a suspension rotor;

a chute located below said suspension rotor, said chute being provided with two lateral suspension arms extending upwards where they are connected to said suspension rotor, so as to define on said suspension rotor a roughly horizontal pivoting axis for said chute;

a driving mechanism to produce a pivoting torque capable of pivoting said chute;

a cylindrical suspension pin that is associated with each suspension arm for pivotably connecting it to said suspension rotor, each of said cylindrical

suspension pins being arranged in a retractable manner in a bearing of said suspension rotor;

a control lever connected by means of an articulated joint to said suspension rotor, said driving mechanism being connected to said control lever so as to transmit to the latter said pivoting torque; and
a stop on said control lever and a counterstop on a suspension arm, said stop and said counterstop engaging with each other to transmit said pivoting torque to said suspension arm, and are designed in such a way that they can be disengaged by a translation movement of the two suspension arms, after withdrawal of said cylindrical suspension pins for removal of said chute.

12. The device according to Claim 11, wherein:

a control lever is associated with each of said suspension arms and connected by means of an articulated joint to said suspension rotor;

said driving mechanism is connected to said control levers so as to transmit said pivoting torque symmetrically to said control levers; and
a stop on each of said control levers cooperates with a counterstop on the suspension arm with which the respective control lever is associated in order to transmit said pivoting torque to said suspension arms.

13. The device according to Claim 12, wherein said driving mechanism comprises:

a control rotor having a rotation axis coaxial with said suspension rotor, said control rotor being provided with an annular gear;

an angular drive that is carried by said suspension rotor and includes:
an input shaft that is provided with a pinion meshing with said annular gear of said control rotor; and
an output shaft that is parallel to the pivoting axis of said chute and driven in rotation when said input shaft is driven in rotation by said annular gear of said control rotor; and

a crank and connecting rod mechanism connecting said output shaft to the control levers.

14. The device according to Claim 11, wherein:
said stop is formed by a driving pivot carried by said control lever; and
said counterstop is formed by a guiding slot provided in said suspension arm.

15. The device according to Claim 14, wherein:
said suspension arm of the chute comprises a lever arm with a free end; and
said guiding slot has an entrance in said free end so that said driving pivot can be introduced into it by a translation of said suspension arm in a direction perpendicular to said driving pivot.

16. The device according to Claim 11, wherein each of the two suspension pins is mounted in a removable way in a housing of said suspension rotor.

17. The device according to 11, wherein each of the two suspension arms comprises an oblong hole for the passage suspension pin associated therewith, so that said suspension pins can be freed by raising said chute.

18. The device according to Claim 17, wherein said suspension pin in one of said suspension arms and said articulated joint of the associated control lever are substantially coaxial.

19. The device according to Claim 18, wherein said control lever is an assembly of two symmetrical half-levers between which is housed a free end of said suspension arm.

20. The device according to Claim 19, further comprising:

an outer casing in which said suspension rotor is suspended, said outer casing comprising a lower screen provided with a circular opening;

a flange carried by the lower end of said suspension rotor, said flange being arranged in said circular opening;

two elongated holes arranged in said flange for the passage of said suspension arms of the chute; and

two supporting flanges flanking each of said elongated holes for supporting said suspension pins.

After the claims, please insert the following Abstract on a separate page:

ABSTRACT

A device for distributing materials in bulk includes a suspension rotor and a chute located below the suspension rotor. The chute is provided with two lateral suspension arms which are connected to the suspension rotor. A driving mechanism produces a pivoting torque capable of pivoting the chute, while a cylindrical suspension pin is associated with each suspension arm for pivotably connecting it to the suspension rotor. A control lever is connected to the suspension rotor, the driving mechanism being connected to the control lever so as to transmit to the latter the pivoting torque. A stop on the control lever and a counterstop on a suspension arm engage with each other to transmit the pivoting torque to the suspension arm. The stop and the counterstop are disengagable by a translation movement of the two suspension arms after withdrawal of the cylindrical suspension pins for removal of the chute.

REMARKS

Applicants submit this Preliminary Amendment to eliminate any multiple dependent claims and to place the application in better U.S. form for prosecution.

Applicants therefore respectfully request examination of the above-referenced application, as now amended.

No fees are considered to be due; however, if it is determined that payment of a fee is required, please charge our deposit account No. 13-0235.

Respectfully submitted,

By _____
Nicholas J. Tuccillo
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Version with Markings to Show Changes Made

A marked-up version of the amendments are shown below showing additions with underlining and deletions between brackets.

In the Specification:

Page 2

The replacement paragraph on page 2, line 23, through page 3 line 4, is as follows:

A device for distributing materials in bulk according to the invention comprises a suspension rotor and a chute located below the suspension rotor. This chute is provided with two lateral suspension arms extending upwards where they are [Each suspension arm is connected to the] connected to the suspension rotor so as to define a roughly horizontal pivoting axis for the chute on the suspension rotor. The device also comprises a driving mechanism for producing a pivoting torque capable of pivoting the chute about its pivoting axis. A cylindrical suspension pin is associated with each suspension arm for pivotably connecting it to the suspension rotor. Each of these two cylindrical suspension pins is arranged in a retractable manner in a bearing of the suspension rotor. A control lever is connected to the suspension rotor by means of an articulated joint. The driving mechanism is connected to this control lever to transmit to the latter the pivoting torque. In order to transmit this pivoting torque to a suspension arm, the control lever is provided with a stop, which comes into contact with a counterstop provided on the respective suspension arm. The stop and counterstop are moreover designed in such a way that they can be disengaged by a translation movement of the two suspension arms after withdrawing the cylindrical suspension pins for removal of the chute. It should be appreciated that this device is distinguished by a very simple and very compact suspension of the chute, which enables large pivoting torques to be transmitted to the chute, while ensuring easy removal and installation of the chute.

Page 4

The replacement paragraph on page 4, lines 9-14, is as follows:

[Each of the two suspensions shafts is preferably mounted in an easily removable way in a housing in the suspension rotor.] In order to facilitate the installation and removal of the suspension pins, each of the two suspension arms of the chute advantageously comprises an oblong hole for the passage of its suspension pin, so that the two suspension pins can be freed by raising the chute.

DEVICE FOR DISTRIBUTING MATERIALS IN BULK WITH A ROTARY CHUTE HAVING A VARIABLE ANGLE OF INCLINATION

The present invention relates to a device for distributing materials in bulk with a rotary chute having a variable angle of inclination. It relates more particularly to such a device comprising a suspension rotor, a chute provided with two suspension arms, each of which is connected to the suspension rotor by means of a suspension pin in such a way as to define on the suspension rotor a pivoting axis for the chute, and a driving mechanism to produce a pivoting torque capable of pivoting the chute about its pivoting axis.

Such devices for distributing materials in bulk are for example used in installations for charging shaft furnaces, particularly blast furnaces, in which the rotary chute with a variable angle of inclination provides for the distribution of the charge inside the shaft furnace. It should be appreciated that, in such a device, the chute is an element subject to wear, which must be replaced from time to time. Hence the necessity of suspending the chute in an easily removable way in its suspension rotor while ensuring a reliable transmission of a large pivoting torque to the chute.

Devices for distributing materials in bulk with a rotary chute having a variable angle of inclination are described, for example, in US patent N°3,814,403, US patent N°5,022,806 and patent application DE 3342572.

The chute in the device described in US patent N°3,814,403 is provided with lateral suspension journals. On one side it comprises two separated suspension journals, which are received in two separated housings of a suspension flange driven in rotation by the pivoting mechanism so that this suspension flange can transmit the pivoting torque to the chute. On the opposite side, it comprises a single suspension journal, which can rotate in a housing of a fixed flange. The journals are fixed in the two flanges by means of transverse wedges.

The chute in the device described in US patent N°5,022,806 is also provided with lateral suspension journals. On one side it comprises two separated suspension journals, which are received in a housing of a suspension flange driven in rotation by the pivoting mechanism, so that this suspension flange can transmit the pivoting torque to the chute. On the opposite side, it comprises a single journal, which is received in the housing of a flange free to rotate on a pivot.

The chute of the device described in the patent application DE 3342572 is provided with two suspension arms of special shape. Each of these suspension arms is received in the housing of a suspension flange driven in rotation by the pivoting mechanism. The shape of the suspension arm provides for the housing of the suspension flange to be locked while allowing the chute to be easily withdrawn after it is raised. The two suspension flanges transmit the pivoting torque to the chute.

The charging device described in the patent application FR 882167 comprises an oscillating charging tube, which is suspended by means of two long horizontal arms like a pendulum in a rotary cylinder. The extremities of the suspension arms are mounted on bearings in the rotary cylinder. One of these extremities carries an actuation lever. A knee-shaped control lever is fixed to the cylinder by means of a bearing. A first extremity of the control lever is connected by a connecting rod to an oscillation mechanism. A second extremity of the control lever bears a slide, which is guided in a closed runner of the activating lever. It is not described how to remove the charging tube.

An objective of the present invention is to propose a device for distributing materials in bulk provided with a simpler and more compact suspension for the chute, which nevertheless allows large pivoting torques to be transmitted to the chute while providing for easy removal and installation of the chute. In conformity with the invention, this objective is achieved by a device according to Claim 1.

A device for distributing materials in bulk according to the invention comprises a suspension rotor and a chute located below the suspension rotor. This chute is provided with two lateral suspension arms extending upwards where they are ~~Each suspension arm is connected to the~~ connected to the suspension rotor so as to define a roughly horizontal pivoting axis for the chute on the suspension rotor. The device also comprises a driving mechanism for producing a pivoting torque capable of pivoting the chute about its pivoting axis. A cylindrical suspension pin is associated with each suspension arm for pivotably connecting it to the suspension rotor. Each of these two cylindrical suspension pins is arranged in a retractable manner in a bearing of the suspension rotor. A control lever is connected to the suspension rotor by means of an articulated joint. The driving mechanism is connected to this control lever to transmit to the latter the pivoting torque. In order to transmit this pivoting torque to a suspension arm, the control lever is provided with a stop, which comes into contact with a counterstop provided on the respective suspension arm. The stop and counterstop are moreover designed in such a way that they can be disengaged by a translation movement of the two suspension arms after withdrawing the cylindrical suspension pins for removal of the chute. It should be appreciated that this device is distinguished by a very simple and very compact suspension of the chute, which enables large pivoting torques to be transmitted to the chute, while ensuring easy removal and installation of the chute.

The pivoting torque may be transmitted to the chute through only one of the two suspension arms. However, a symmetrical transmission of the pivoting torque to the two suspension arms is more advantageous. For this purpose, a control lever is associated with each of the two suspension arms and connected by means of an articulated joint to the suspension rotor. The driving mechanism is then connected to the two control levers to transmit the pivoting torque symmetrically to said levers. In this device, in order to transmit the pivoting torque to the two suspension arms of the chute, a stop on each of the two control levers cooperates with a counterstop on the suspension arm with which the respective control lever is associated.

It is of course possible to devise different driving mechanisms to transmit a pivoting torque to the control lever or levers. In a preferred embodiment, this driving mechanism comprises a control rotor having a rotation axis coaxial with the suspension rotor, and an angular drive carried by the suspension rotor. The input shaft of this angular drive is provided with a pinion, which meshes with an annular gear carried by the control rotor. Its output shaft is parallel to the pivoting axis of the chute and is driven in rotation when the input shaft is driven in rotation by the control rotor. A mechanism consisting of a crank and connecting rod connects the output shaft to the control lever or levers. It should be noted that a rotation of the input pinion of the angular drive takes place if there is a difference in angular speed between the suspension rotor and the control rotor. This rotation of the input shaft produces a rotation of the output shaft of the angular drive which is converted by the crank and connecting rod mechanism into a pivoting of the control lever or levers about their articulated joint or joints on the suspension rotor.

It is also possible to devise different embodiments of the stop and the counterstop. In a preferred embodiment, the stop is for example formed by a driving pivot carried by the control lever. The counterstop is then advantageously formed by a guiding slot made in said suspension arm of the chute. This guiding slot advantageously has an entrance in the free end of the arm so as to be able to introduce into it the driving pivot by a translation of the suspension arm in a direction perpendicular to the driving pivot.

~~Each of the two suspensions shafts is preferably mounted in an easily removable way in a housing in the suspension rotor.~~ In order to facilitate the installation and removal of the suspension pins, each of the two suspension arms of the chute advantageously comprises an oblong hole for the passage of its suspension pin, so that the two suspension pins can be freed by raising the chute.

In order to optimise the transmission of the pivoting torques from the

control lever to the suspension arm, it is advantageous to have the suspension pin of the suspension arm and the articulated joint of the control lever substantially coaxial.

With the same objective, it is also advantageous to form the control lever from an assemblage of two symmetrical half-levers between which is then housed a free end of the suspension arm.

In a preferred embodiment, the device comprises an outer casing in which the suspension rotor is suspended. This casing is equipped with a lower screen, which is provided with a circular opening. The lower end of the suspension rotor carries a flange that is set into this circular opening. In this flange are positioned two elongated holes for the passage of the two suspension arms of the chute. Two supporting flanges flank each of the elongated holes for the support of the suspension pins at their two ends.

Other special features and characteristics of the invention will emerge from the detailed description of an advantageous embodiment given below as an illustrative example with reference to the appended drawings. The latter show:

Figure 1: a vertical cross-section through a device for distributing materials in bulk with a rotary chute having a variable angle of inclination;

Figure 2: a horizontal cross-section through the device in Figure 1;

Figure 3: a vertical cross-section similar to that of Figure 1, illustrating the removal of the chute;

Figure 4: a vertical cross-section showing details of the suspension of the chute of the device in Figure 1;

Figure 5: a vertical cross-section similar to that in Figure 4, illustrating the

removal of the chute.

The device for distributing materials in bulk 10 shown in Figures 1 and 2 is more particularly intended to form part of a device for charging a shaft furnace, such as a blast furnace for example, represented schematically by its upper end 12.

This device 10 comprises an outer casing 14, which is connected in an impervious manner to the upper end 12 of the shaft furnace. This outer casing 14 is provided with a fixed charging duct 16, which is substantially coaxial with the vertical axis 18 of the shaft furnace and which emerges imperviously from the upper end (not shown) of the outer casing 14. A suspension rotor 20 is suspended in the outer casing 14, for example by means of a large diameter roller ring (not shown). This suspension rotor 20 comprises a vertical suspension sleeve 24 surrounding the fixed charging duct 16 and provided with a horizontal flange 26 at its lower end. This flange 26 is set into a circular opening of a lower screen 28 which separates the inside of the casing 14 from the inside of the furnace.

In Figure 1, the reference number 30 denotes a second rotor, also called a control rotor 30. This control rotor 30 surrounds the suspension rotor 20 and is suspended in the outer casing 14, for example using a large diameter roller ring (not shown), so as to have its rotation axis substantially coaxial with the rotation axis of the suspension rotor 20. The two rotors 20 and 30 are driven in rotation by a driving device (not shown in the figures). This driving device comprises, in a way known per se, a first pinion, which meshes with an annular gear of the suspension rotor 20, and a second pinion, which meshes with an annular gear of the control rotor 30. With the help of two motors and a differential mechanism, which are installed outside the casing 14, this driving device is suitable for driving in rotation the two rotors 20, 30, either with perfectly synchronised rotational speeds or with different rotational speeds.

The reference number 32 denotes a chute for distributing materials in bulk through the charging duct 16. This chute 32 comprises two lateral suspension arms 34, 34'. On both sides of the suspension sleeve 24, the flange 26 is provided with two elongated holes 35, 35' through which the free ends of the two suspension arms 34, 34' penetrate into the inside of the outer casing 14. Above the flange 26, the two suspension arms 34, 34' are connected to the suspension rotor 20 by means of two suspension pins 36, 36'. The latter are housed in bearings 37, 37' which are provided on the flange 26 on both sides of the suspension sleeve 24 so as to define on the suspension rotor 20 a substantially horizontal pivoting axis for the chute 32.

The reference number 38 denotes in a general way an angular drive carried by the flange 26 of the suspension rotor 20. This angular drive 38 comprises a vertical input shaft 40, which is parallel to the rotation axis of the two rotors 20, 30 and which is fitted with a pinion 42 meshing with an annular gear 44 on the control rotor 30. It also comprises a horizontal output shaft 46, which is parallel to the pivoting axis of the chute 32 and which has two free ends, each provided with a crank 48, 48'. A system of gears interconnects the input shaft 40 and the output shaft 46 in such a way as to convert a rotation of the vertical input shaft 40 into a rotation of the horizontal output shaft 46.

Two connecting rods 50, 50' connect the two cranks 48, 48' symmetrically to two control levers 52, 52', each of which has roughly the shape of a right-angle bracket with two arms. For each of these two control levers 52, 52', the end of one of these arms is connected by an articulated joint to its connecting rod 50, 50', while the end of the other arm is connected by means of an articulated joint 54, 54' to the suspension rotor 20. These articulated joints 54, 54' define for each control lever 52, 52' on the suspension rotor 20 a pivoting axis substantially coaxial with the pivoting axis of the chute 32.

It was seen above that a rotation of the input pinion 42 of the angular drive 38 produces a rotation of the cranks 48, 48'. This is converted by the connecting

rods 50, 50' into a symmetrical pivoting of the two control levers 52, 52' about their articulated joints 54, 54'. Now, a rotation of the input pinion 42 occurs if there is a difference in angular speed between the suspension rotor 20 and the control rotor 30. In other words, to cause the two control levers 52, 52' to pivot symmetrically about their articulated joints 54, 54', it is sufficient to drive the control rotor 30 at an angular speed different from that of the suspension rotor 20.

According to an important feature of the present invention, the transmission of a pivoting torque from the control levers 52, 52' to the suspension arms 34, 34' relies on a stop-counterstop system, in which a stop on the control lever 52, 52' simply comes into contact with a counterstop on the suspension arm 34, 34' in order to transmit the pivoting torque. The stop is for example formed by a driving pivot 56, 56' carried by the control lever 52, 52', while the counterstop is then formed by a guiding slot 58, 58'. The latter is advantageously provided in the free end of the suspension arm 34, 34' and makes in the latter an entrance, so that the driving pivot 56, 56' can be introduced into its slot 58, 58' by a simple translation of the suspension arm 34, 34' in a direction perpendicular to the driving pivot 56, 56'.

Figure 4 shows a preferred embodiment of the control lever assembly 52, the suspension pin and the suspension arm 34. It can be seen that the control lever 52 is formed by an assembly of two symmetrical half-levers 60', 60", between which the free end of the suspension arm 34 is housed. Said suspension arm passes through the elongated hole 35, which is provided in the flange 26 of the suspension rotor 20 and which is flanked by two supporting flanges 62', 62". Each supporting flange 62', 62" is provided with a bush 64', 64". Said articulated joint 54 of the lever 52 on the suspension rotor 20 is then formed by mounting a journal 66' of the half-lever 60' in the bush 64' of the supporting flange 62' and a journal 66" of the half-lever 60" in the bush 64" of the supporting flange 62". Each of these two journals 66', 66" is also provided with a central bore 68', 68" against which one end of the suspension pin 36 bears. It should be noted

that the central axis of the suspension pin 36 is substantially coaxial with the central axis of the articulated joint 54 of the control lever 52. Mechanical stops (not shown) provide for the axial blockage of the suspension pin 36. However, after removal of these mechanical stops, the suspension pin 36 can easily be withdrawn from its housing formed by the two bores 68', 68".

In order to facilitate the installation and removal of the suspension pins 36, 36', each of the two suspension arms of the chute incorporates an oblong hole 70, 70' for the passage of its suspension pin 36, 36'. This oblong hole 70, 70' is located along the extension of the slot 58, 58' so that the two suspension pins 36, 36' can be freed by raising the chute 32. This is illustrated by comparing Figures 4 and 5. In Figure 4, the suspension arm 34 presses on the suspension pin 36 with the upper edge of its oblong hole 70. In Figure 5, the chute 32 is in a raised position, in which there is a clearance "J" between the upper edge of the oblong hole 70 and the suspension pin 36 so as to free the suspension pin 36. It remains to note that the reference number 72 in Figure 4 denotes a mechanical stop which prevents an unwanted raising of the chute 32. In Figure 5, this mechanical stop 72 is removed.

The procedure for removing the chute is illustrated by Figure 3. The reference number 100 denotes a device for handling the chute 32 which is suspended from the cable 102 of lifting gear. This handling device 100 is coupled to the chute 32 through an opening for removal 104 provided in the upper end 12 of the shaft furnace. In a first step, the chute 32 is slightly raised in order to bring the two suspension pins 36, 36' into the position shown in Figure 5 by a translation of the two suspension arms 34, 34'. In this position, it is now easy to withdraw the two suspension pins 36, 36' from their respective housings. The chute 32 is then allowed to descend in order, by a translation of the two suspension arms 34, 34', to free the two driving pivots 56, 56' from their respective guiding slots 58, 58'. It is then possible to withdraw the chute 32 laterally through the opening for removal 104. A counterweight 106 on the handling device 100 keeps the chute 32 substantially parallel to itself during the

whole operation of withdrawal. The operation of installing the chute is carried out in the opposite way.

P-PWU-427/WO-AMENDED

CLAIMS

1. Device for distributing materials in bulk comprising:
a suspension rotor (20);

a chute (32) located below said suspension rotor (20), said chute (32) being provided with two lateral suspension arms (34, 34') extending upwards where they are connected to said suspension rotor (20), so as to define on the suspension rotor (20) a pivoting axis roughly horizontal for said chute (32); and

a driving mechanism to produce a pivoting torque capable of pivoting said chute (32);

characterised by

a cylindrical suspension pin (36, 36') that is associated with each suspension arm (34, 34') for pivotably connecting it to said suspension rotor (20), each of said two cylindrical suspension pins (36, 36') being arranged in a retractable manner in a bearing of said suspension rotor (20);

a control lever (52, 52') connected by means of an articulated joint (54, 54') to said suspension rotor (20), said driving mechanism being connected to said control lever (52, 52') so as to transmit to the latter said pivoting torque; and

a stop (56, 56') on said control lever (52, 52') and a counterstop (58, 58') on a suspension arm (34, 34'), said stop (56, 56') and said counterstop

(58, 58') engaging with each other to transmit said pivoting torque to said suspension arm (34, 34'), and being designed in such a way that they can be disengaged by a translation movement of the two suspension arms (34, 34'), after withdrawal of said cylindrical suspension pins (36, 36') for removal of said chute (32).

2. Device according to Claim 1, characterised
in that a control lever (52, 52') is associated with each of the two suspension arms (34, 34') and connected by means of an articulated joint to said suspension rotor (20);
in that said driving mechanism is connected to the two control levers (52, 52') so as to transmit said pivoting torque symmetrically to said levers; and

in that a stop (56, 56') on each of the two control levers (52, 52') cooperates with a counterstop (58, 58') on the suspension arm (34, 34') with which the respective control lever (52, 52') is associated in order to transmit said pivoting torque to the two suspension arms (34, 34') of the chute (32).

3. Device according to Claim 2, characterised in that said driving mechanism comprises:

a control rotor (30) having a rotation axis coaxial with said suspension rotor (20), said control rotor (30) being provided with an annular gear (44);

an angular drive (38) that is carried by said suspension rotor (20) and comprises:

an input shaft (40), which is provided with a pinion (42) that meshes with the annular gear (44) of said control rotor (30); and

an output shaft (46), which is parallel to the pivoting axis of the

chute (32) and which is driven in rotation when said input shaft (40) is driven in rotation by the annular gear (44) of said control rotor (30);

a crank and connecting rod mechanism (48, 50, 48', 50') connecting said output shaft (46) to the two control levers (52, 52').

4. Device according to any one of Claims 1 to 3, characterised in that:
said stop is formed by a driving pivot (56, 56') carried by said control lever (52, 52'); and

said counterstop is formed by a guiding slot (58, 58') provided in said suspension arm (34, 34') of the chute (32).

5. Device according to Claim 4, characterised in that:
said suspension arm (34, 34') of the chute (32) comprises a lever arm with a free end; and

said guiding slot (58, 58') has an entrance in said free end so that said driving pivot (56, 56') can be introduced into it by a translation of the suspension arm (34, 34') in a direction perpendicular to said driving pivot (56, 56').

6. ~~Device according to any one of Claims 1 to 6, characterised in that each of the two suspension pins (36, 36') is mounted in a removable way in a housing of the suspension rotor (20).~~

6. Device according to any one of Claims 1 to 5, characterised in that each of the two suspension arms (34, 34') of the chute (32) comprises an oblong hole (70, 70') for the passage of its suspension pin (36, 36') so that the two suspension pins (36, 36') can be freed by raising the chute (32).

7. Device according to any one of Claims 1 to ~~7~~6, characterised in that the suspension pin (36, 36') of the suspension arms (34, 34') and the articulated joint (54, 54') of the control lever (52, 52') are substantially coaxial.

8. Device according to any one of Claims 1 to ~~8~~7, characterised in that the control lever (52, 52') is formed by an assembly of two symmetrical half-levers (60', 60") between which is housed a free end of the suspension arm (34, 34').

9. Device according to any one of Claims 1 to ~~9~~8, characterised by:
an outer casing (14) in which said suspension rotor (20) is suspended, said casing (14) comprising a lower screen (28) provided with a circular opening;

a flange (26) carried by the lower end of said suspension rotor (20), said flange (26) being set into said circular opening;

two elongated holes (35, 35') located in said flange (26) for the passage of the two suspension arms (34, 34') of the chute (32); and

two supporting flanges (62', 62") flanking each of said elongated holes (35, 35') for the support of the suspension pins (36, 36') at each of their ends.

DECLARATION, POWER OF ATTORNEY AND APPOINTMENT OF DOMESTIC REPRESENTATIVE

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

the specification of which

(Check one) __X__ is attached hereto.

_____ was filed on_____
as Application Serial No._____
and was amended on_____
(if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the U.S. Patent and Trademark Office all information known to be material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, §§1.56 and 1.63(d).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s):

			Priority Claimed
LU 90 433	Luxembourg	03/09/99	Yes
(Number)	(Country)	(Day/Month/Year Filed)	Yes/No

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §§1.56 and 1.63(d) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

(Application Serial No.)	(Filing Date)	(Status - Patented, pending, abandoned)

POWER OF ATTORNEY

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and amendments therein, to receive the patent and all correspondence relating to this application, and to transact all business in the U.S. Patent and Trademark Office connected therewith, and the said attorneys are hereby given full power of substitution and revocation.

APPOINTMENT OF DOMESTIC REPESENTATIVE

The above-identified attorneys, also known as McCORMICK, PAULDING & HUBER LLP, whose postal address is CityPlace II, 185 Asylum Street, Hartford, Connecticut 06103-4102, United States of America, are hereby designated Applicant's representative upon whom notices or process in proceedings affecting the patent may be served. Said firm shall take instructions from my foreign patent agents in all matters affecting this application and the patent.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

1-00 2-00

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